

# NASA TECH BRIEF



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## Teleprinter Uses Thermal Printing Technique

An alphameric/facsimile printer receives serial digital data in the form of a specified number of bits per group, with the time duration of each bit a specified number of milliseconds. Each group of bits is followed by a data pause which will last a specified number of milliseconds. The printer prints a black dot on the thermally sensitive paper for each digital "one" received and prints nothing for each digital "zero" it receives. The first data bit per group is placed at the left edge of the paper and each succeeding bit is placed a specified distance to the right of the preceding dot position on the paper.

The thermal print head is composed of the same number of printing elements as there are bits per group. These print elements are arranged in a single line oriented across the specified width of the paper. Electrically, these print elements are energized in convenient subgroups. Each element in a subgroup has a common electrical terminal with other elements in the subgroup, and this common terminal is grounded by a solid state switch when it is the proper time for one or more of the elements in the subgroup to be heated in accordance with the incoming signal. The other terminal of each thermal element is connected via the gate terminal, a silicon-controlled rectifier (SCR), to a solid state shift-register stage which momentarily memorizes the incoming serial digital data. The shift register can memorize data for several subgroups of thermal elements; so at the time it is interrogated, it contains data for several subgroups of thermal elements.

A dc voltage is applied continuously to the anode of the SCR. If the cathode of the SCR is grounded and if there is a "one" in the shift register state to

which the gate of the SCR is connected, the SCR will conduct. A print pulse is routed through an "AND" gate along with the grounder signal to the base of the grounder transistor. The print pulse turns on the grounder for an appropriate number of milliseconds. Since one side of a thermal printing element is connected to the cathode of the SCR, current will pass through the thermal element to the common electrical terminal for the group if the common is grounded by the grounder transistor at that time.

If there is a "zero" in the shift register stage to which the gate of the SCR is connected, the SCR will not conduct when the print pulse turns on the grounder transistor and, consequently, no current will flow in the thermal element connected to the SCR cathode.

The roll or fan-fold paper coated with a thermally sensitive dye is stored in or near the teleprinter assembly. The paper is routed between a pressure roller and the thermal head assembly. The paper is then pulled around the pressure roller as they both turn in discrete angular steps. The paper then passes through guides behind a preview window to a slot in the front panel where it exits for viewing by the observer.

### Note:

Inquiries concerning this invention may be directed to:

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Houston, Texas 77058  
Reference: B67-10572

(continued overleaf)

**Patent status:**

Title to this invention has been waived under the provisions of the National Aeronautics and Space Act (42 U.S.C. 2457 (f)), to The National Cash Register Company, Menlo Park, California 94025.

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